FACULDADE ENGENHARIA

Departamento de Informática

Test-Driven Development in Python

What is TDD?

- Test-Driven Development (TDD) is a software development process where tests are written before code. The process encourages writing tests, then code to pass them.

- Key principles:
  - Write tests first.
  - Keep tests small and incremental.

Benefits of TDD

- Improves code quality
- Encourages better design
- Prevents bugs early
- Cleaner code through refactoring

TDD Workflow

- Write a test: start by writing a simple test that fails.
- Write code: write the minimal code to pass the test.
- Refactor: improve the code, ensuring it passes the test.
- Repeat: add new tests for additional functionality.

First Example: unittest Framework

- Example using *unittest* framework in Python:

```
import unittest
class TestExample(unittest.TestCase):
  def test_addition(self):
    self.assertEqual(1 + 1, 2)
if __name__ == '__main__':
    unittest.main()
```

Writing a Failing Test

- Example of a failing test:

```
def test_addition(self):
    self.assertEqual(add(2, 3), 5)
```

- The code for the add function hasn't been written yet, so the test will fail.

Write Minimum Code to Pass

- Now, write the function:

```
def add(a, b):
    return a + b
```

- Run the test, and it should pass.

Refactor the Code

- After the test passes, check if the function can be improved, such as adding error handling or optimizing the code.

Advanced Testing Techniques

- Mocking: isolating parts of the code for more focused testing.
- Parameterized tests: running the same tests with different data sets.
- Continuous Integration (CI): automating testing in the development cycle.

Best Practices

- Keep tests simple.
- Test one thing at a time.
- Run tests frequently.
- Aim for full code coverage.

Conclusion

- TDD ensures high-quality code through iterative development. Practice writing tests first and enjoy the benefits of clean, bug-resistant code.


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